Project X, Neutrino factory and Muon Collider Wrap-Up

Keith Gollwitzer
Accelerator Division
Fermilab

Project X Evolution

- Project X first addressed the neutrino program of 2MW from the Main Injector with ICD-1
- Project X evolved into ICD-2 when considering the possible muon, kaon, nuclear physics programs
- At first glance, pulsed Linac option appears to better satisfy NF/MC requirements than RCS

Accumulation Issue

- Or call it Stripping Issue
- With current parameters (8GeV and 1mA CW Linac), some ring will have an accumulate factor of 50%
- Possible solution is to increase CW Linac current

Ring Issues

- Proton Accumulation Ring and Bunch Compressor Ring have to be studied
  - Could be single ring?
  - Space Charge
  - Instabilities
  - Targetry considerations
  - Where the trade-offs will be

Possible Upgrade Paths

- Should design Project X to be upgradable
- Should do basic cost exercise to do upgrades

  - 3-8GeV pulsed Linac convertible to CW
  - Increase CW Linac beam current
  - RCS to higher energy
  - RCS rate increase
  - Some combination of above

R&D

- Starting design of Bunch Compression Ring based upon targetry considerations
- Proton Accumulator Ring will be designed to bridge Project X evolution and BCR
- Possible stripping techniques to be tested
- If Project X is built in phases
  - An accelerator R&D area should be part of 3GeV switchyard

Project X Strategy/Timeline

- Department of Energy Science and Technology Review July 13-15
  - ⇒ Accelerator concept sufficiently developed for CD-0
  - ⇒ Physics case not sufficiently developed for CD-0
- August: Complete preliminary design, configuration, and cost range information for IC-2
  - ICD-2v2.0
  - Cost estimate
  - Updated RD&D Plan with resource loaded schedule
- Continue conceptual development on outstanding technical questions
  - Baseline concept for the chopper
  - Concepts for marrying a 3-8 GeV pulsed linac to CW front end
  - Injection into RCS or Recycler
- Pursue R&D aimed at the CW linac
  - Emphasis of srf development at all relevant frequencies
  - Engage external collaborators and identify roles
- Further development of the physics program
  - Five working groups established to complete draft white papers by 8/31; fall physics workshops
- Prepare to complete all RD&D supporting a FY2015 construction start
  - Prepare to construct Project X over a five year time period

Strategy

- Identify what will need to be upgraded above the baseline and determine if we can build in an easy upgrade path
  - Rough costing?

- As Project X settles/evolves to a configuration, determine better the upgrade path